Rice Lake Digital Wheelchair Scale

340-10 Series

Software Revision 11387

Technical and Operating Instructions

RICE LAKE
WEIGHING SYSTEMS
To be the best by every measure®

118580

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*Technical training seminars are available through Rice Lake Weighing Systems. Course descriptions and dates can be viewed at **www.ricelake.com** or obtained by calling 715-234-9171 and asking for the training department*

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Rice Lake continually offers web-based video training on a growing selection of product-related topics at no cost. Visit www.ricelake.com/webinars.

1.0 Introduction

The Rice Lake Digital Wheelchair Scale from Rice Lake is a user-friendly, quality scale, designed for safe weighing of the handicapped and mobility challenged individuals. Movement compensation technology ensures sound, accurate weighments. The scale has roll on ramp access and comes in four different configurations:

- Single ramp wheelchair scale
- Single ramp platform wheelchair scale
- Dual ramp wheelchair scale
- Dual ramp platform wheelchair scale

The scale has a non-skid rigid platform and two rear heavy duty wheels for easy maneuverability.

Figure 1-1. Digital Wheelchair Scale (single ramp and dual ramp models shown)

The scale is set up to use motion sensing technology, to determine actual weight of a moving patient. The weight can be displayed in either pounds or kilograms and you can enter a tare weight. The scale operation section on page 8 of this manual explains the scale operation and how to obtain a tare weight.

The wheelchair scale has a unique folding feature that enables easy transportation and simplifies assembly, avoiding the need for field wiring and recalibration. All that is required is to open the packaging and unfold the scale.

Place a known weight on each corner of the scale. The display should illuminate that known weight. If it does not, trimming will be required. See “Trimming Procedure” on page 28.

Internet

This manual can be viewed and downloaded from the Rice Lake Weighing Systems web site at www.ricelake.com/health. Technical information on these products and other medical products are available on the Rice Lake Weighing Systems web site.

Rice Lake Weighing Systems is an ISO 9001 registered company.

2.0 Scale Assembly

2.1 Unpacking Your Scale

Place the unopened box in an open area that has ample room for unpacking the scale.

Recommended tools needed to set up your scale include:

- Scissors or a box cutter

Using scissors or a box cutter, cut the strapping bands that secure the box together. Immediately after opening the box, visually inspect your scale to ensure all parts are included and undamaged.

Parts contained in the shipping box include:

- The scale
- This manual
- Small box containing AC adaptor, RS-232 cable, and scale feet

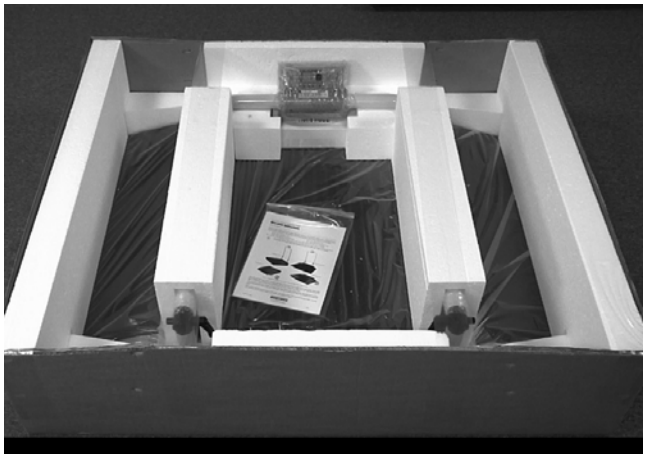

Figure 2-1. Box Contents Including the Scale Surrounded by Styrofoam Packing Material

2.2 Repacking

If the Digital Wheelchair Scale must be returned for modification, calibration or repair, it must be properly packed with sufficient packing materials. Whenever possible, use the original carton when shipping the scale back.

Note ***Damage caused by improper packaging is not covered by the warranty.***

2.3 Setting Up Your Scale

Use the following steps to set up the Digital Wheelchair Scale.

1. Locate the users manual from inside the box and set aside as it will provide instructions on the proper scale removal and set up.
2. Using two people, remove the scale out of the packaging material that it came in by lifting the scale out of the box by the scale base as shown in Figure 2-2.

Note ***DO NOT lift the scale out of the box by its handle as this can cause the hinges to break or affect the scale operation.***

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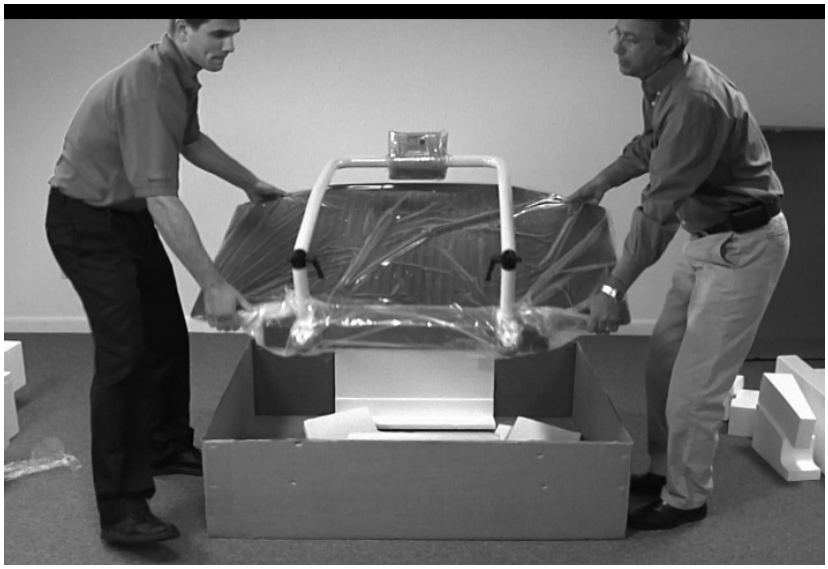

Figure 2-2. Lift the Scale From the Box

3. Move the scale into the area where the weighing process will occur. It's recommended to place the scale on a hard, level surface for the most accurate weighments. Thin carpeting is fine but not recommended.
4. Stand the scale on its side as shown in Figure 2-3, so that the plastic packaging material can be removed.

Figure 2-3. Remove Plastic Covering Material

2.4 Attaching the Feet to the Scale

The Digital Wheelchair Scale comes with four feet that must be attached to the scale base for proper operation. The four feet are located in the parts box in the original shipping box. Use the following steps to attach the feet to the scale.

1. Screw the four round feet clockwise into the scale base as shown in Figure 2-4.

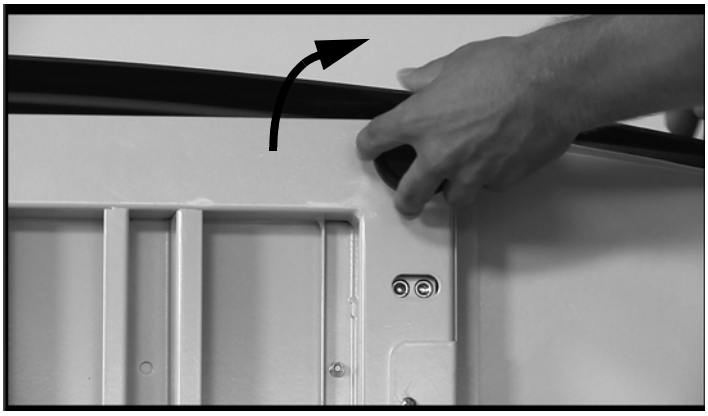

Figure 2-4. Screw Feet Into the Scale Platform

2. There must be adequate clearance between the scale base and the floor so screw each foot out counterclockwise two full turns. This will ensure that there is enough clearance between the scale base and the floor.
3. Gently set the scale base down to the floor. There should be minimal clearance between the scale base and the floor without having the scale base actually touching the floor. Figure 2-5 shows the width of a finger being slid under the scale base and the floor.

Note ***By not having clearance around the scale base will create inaccurate weighments***

Figure 2-5. Have a Minimal Amount of Clearance Between the Scale Base and the Floor

4. It's also important to make sure that the scale is completely level. Gently press down on all corners of the scale base to ensure that there are no high spots or rocking of the scale base.

Note ***An un-level base will produce inaccurate weight readings.***

5. Loosen the handles (shown in Figure 2-6) and set upright as shown in Figure 2-7.

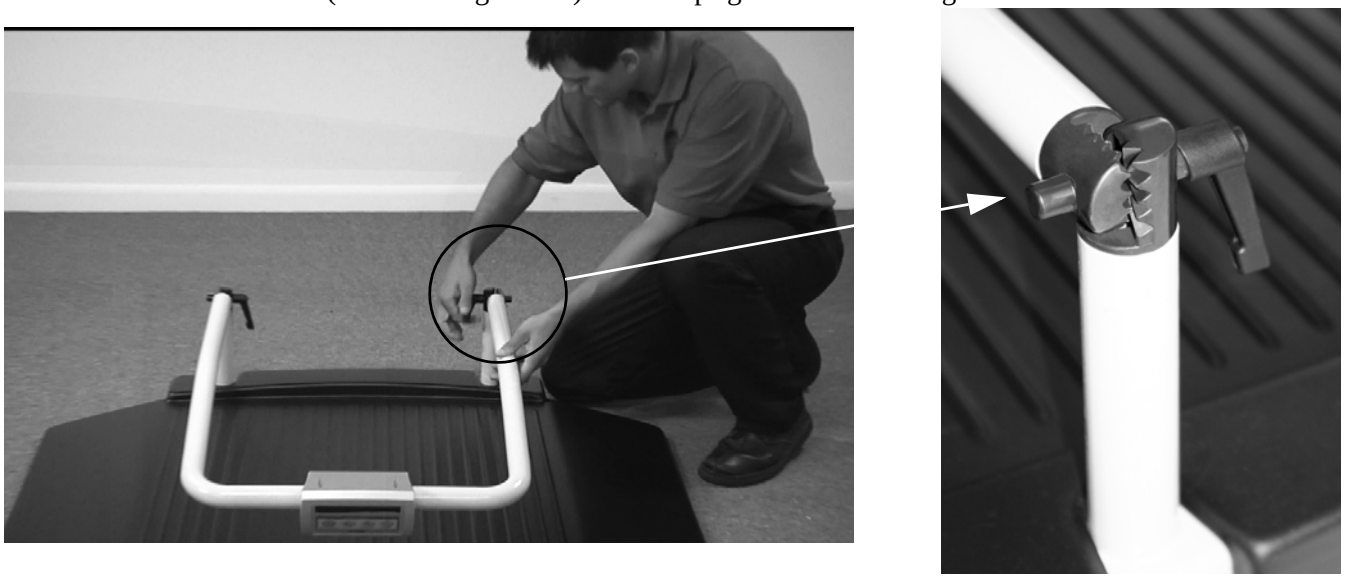

Figure 2-6. Loosen the Durable Hinges to Set Handles Upright

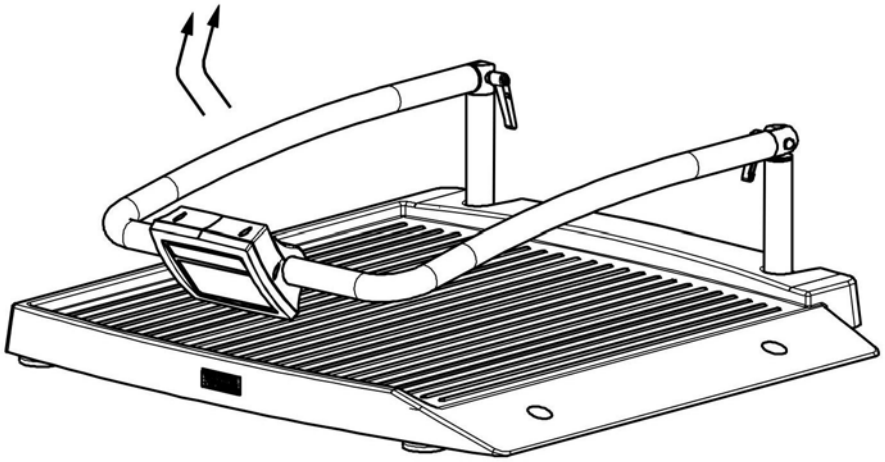

Figure 2-7. Set Scale Handles Upright

6. Tighten the two hinges on the Digital Wheelchair Scale by rotating the two handles. This will secure the handrail mounted indicator.

2.5 Hooking up the AC Power Connections

The Digital Wheelchair Scale has a 120 VAC adaptor or 230 VAC adaptor to use when power is readily available. The AC power adaptor plugs into the back of the indicator as shown in Figure 2-8.

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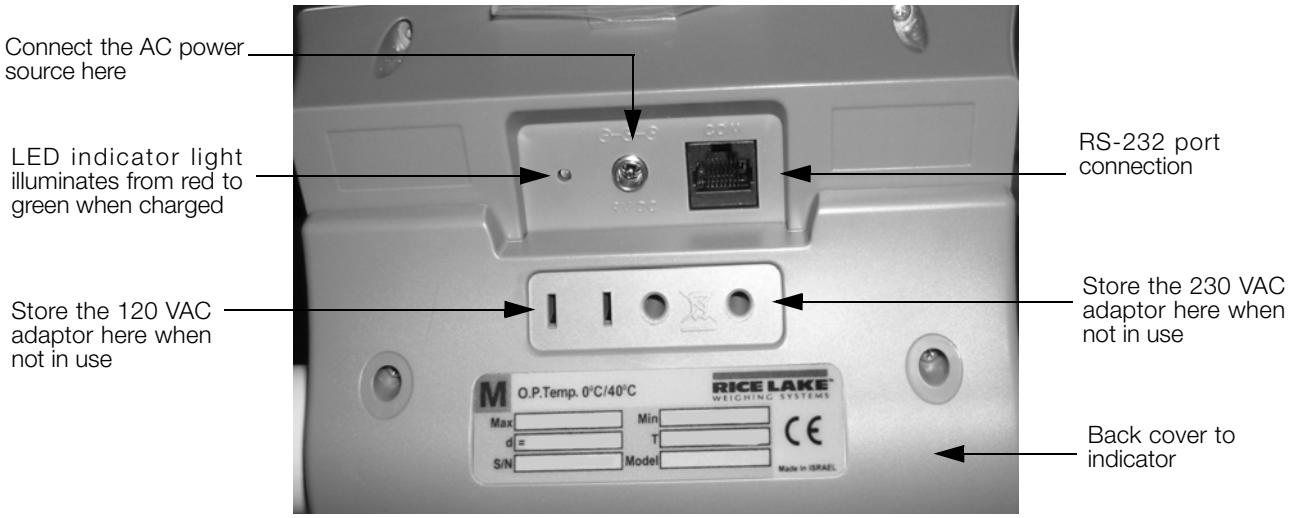


Figure 2-8. LED Light Location

The AC adaptor, when not in use, plugs into the back housing of the indicator for storage. Figure 2-8 shows that location.

The Digital Wheelchair Scale is capable of running its internal sealed lead-acid rechargeable battery if no additional power source is available. Battery life is approximately 75 hours. If the *LO Bat* indicator is showing on the display, recharge the battery or connect the scale to an AC power source as soon as possible for accurate weighing.

Battery Charging

When the AC adaptor is connected to a power source, the rechargeable battery goes into recharge mode.

Note ***To maintain battery longevity we recommend you charge it on a regular basis rather than waiting until it is fully discharged.***

The LED indicator light on the back of the scale housing will illuminate red during the charging period, and change over to green when the battery becomes fully charged.

2.6 Getting Ready to Weigh a Patient

Once the scale is properly unpacked and set up, and prior to weighing a patient, step on the scale to check the scale that all functions are working correctly. The scale is calibrated from the factory so simply turn on the scale and step on the scale to get a weight reading. Press the **REWEIGH** key again to verify that weight.

Figure 2-9. Press The Reweigh Key to Verify Weight

3.0 Scale Operation

The display has various front panel keys. They are shown below and their function is described in 3-1.

Figure 3-1. Front Panel Display Keys

Key	Name	Function
	ON-OFF/ZERO	ON-OFF - Switches the scale on or off. ZERO - Clears weight off the scale and returns it back to zero.
	BMI/TARE	BMI - Enables the user to access the BMI (Body Max Index) function. TARE - Used to subtract a weight off the scale ie: wheelchair.
	REWEIGH	Allows you to reweigh a patient without having them leave the scale.
	Kg-Lb/PRINT	Allows the user to toggle between kilograms and pounds. Press this key to print a weight if connected to a printer.

Table 3-1. Key Functions

Caution ***The keys on the front panel display are very sensitive so only a gentle pushing motion is required to obtain results.***

The scale has the capability of performing different operations beyond just calculating weight. The various operating instructions are described below.

3.1 Weighing a Patient

Use the following steps to weigh a person.

1. Press the **On-Off/Zero** key to turn on the scale and *0.0* will appear on the display.
2. Wheel the patient onto the scale. The display shows *WEIGH*, then the patient's weight, and beeps to indicate the end of the weighing process.
3. To ensure an accurate weighing, press the **REWEIGH** key.
4. To change the display from Kg to Lb and vice-versa, press the **Kg-Lb** key.
5. The scale is set to lock in the weight when the weighing process is complete. The weight will remain on the display even after the patient exits off the scale. To clear the weight, press the **On-Off/Zero** key.
6. To turn off the scale, press and hold the **On-Off/Zero** key until *OFF* appears on the display.

3.2 Using the Body Mass Index (BMI) Function

Body mass index (BMI) is the relationship between weight and height associated with body fat and health risk. It is a reliable indicator of body fatness for people and even though BMI does not measure body fat directly, research has shown the BMI correlates to direct measures of body fat. BMI is an inexpensive and easy-to-perform method of screening for weight categories that may lead to health problems for adults.

Calculating BMI is one of the best methods for population assessment of overweight and obesity. Because calculation requires only height and weight, it is inexpensive and easy to use for clinicians and for the general public. The calculation is based on the following formulas:

Calculate BMI by dividing weight in pounds (lbs) by height in inches (in) squared and multiplying by a conversion factor of 703.

Example: weight = 150 lbs, height = 5’5 (65")

Calculation: $[150 \div (65)^2] \times 703 = 24.96$

The standard weight status categories associated with BMI ranges for adults are shown in the following table.

BMI	Weight Status
Below 18.5	Underweight
18.5 - 24.9	Normal
25.0 - 29.9	Overweight
30.0 and Above	Obese

Table 3-2. Standard Weight Status

The following examples show weight ranges, the corresponding BMI ranges and the weight status categories for a sample height.

Height	Weight Range	BMI	Weight Status
5’9”	124 lbs or less	Below 18.5	Underweight
	125 lbs to 168 lbs	18.5 to 24.9	Normal
	169 lbs to 202 lbs	25.0 to 29.9	Overweight
	203 lbs or more	30 or higher	Obese

Table 3-3. BMI Ranges and Weight Status Example

Use the following steps in determining the BMI.

1. To use the BMI function, weigh the patient as described under Weighing and then press the **BMI** key. If weighing in Lbs, the default height of (5 feet) appears on the display. Use the up or down arrows to increase the feet height by one foot increments). Press the **BMI** key again to display inches (default is 7.0 inches) Again, use the up or down arrows to increase or decrease the inches height by 0.5" increments. Press the **BMI** key again to accept the inches value. The final height value will be displayed ie: 5-07.5 = 5’ 7.5".
2. If you are weighing in Kgs, the default will be 170.0 cm. Use the up or down arrows to increase or decrease by 0.5 cm increments.
3. To see the patient’s calculated BMI, press the **BMI** key again. The BMI appears.
4. To cancel the BMI display, press the **BMI** key.

3.3 Using the Tare Function

You can use the tare function for deducting an extra weight (such as a wheelchair, or medical equipment attached to the patient) in a weighing operation.

To get the most accurate reading, always use the same equipment for pre-weighing (getting the tare weight) which includes things like the wheelchair footrests, blankets, etc.

Determining a Tare

Use the following steps to use the tare function.

1. With the scale set to *0.0*, place the extra load (wheelchair) on the scale. The display shows *WEIGH* and then the weight of the wheelchair.
2. Press and hold the **TARE** key until *TARE* appears on the display. The display returns to 0.0 and *TARE* appears on the left side of the display.
3. Remove the wheelchair from the scale. The weight of the wheelchair appears with a negative symbol to the left of it.
4. Wheel the patient onto the scale. The display then shows the patient's weight without the weight of the wheelchair.
5. The weight of the wheelchair remains stored in memory, so you can continue to weigh patients who are carrying the same tare weight. For example, when using the same wheelchair for weighing more than one patient.
6. To cancel the tare weight, press and hold the **TARE** key until *TARE* disappears from the display and the display returns back to *0.0*. The tare weight is also cancelled when the scale is turned off.

Entering a Known Tare Manually

Use the following steps to enter a tare without placing that item on the scale. An example of this would be if you've got a patient in a wheelchair and the wheelchair has a known weight (has been tagged) you can enter that weight manually.

1. With the scale set to *0.0 Lbs* (there must be no weight on the scale), press the **TARE** key. The display will alternate between a value and the word *TARE*.
2. To change the value, press and hold the **Kg/Lb** key until the right most digit is equal to the first digit of the value you want. Example: If you want 103.5, hold the key until the display is *0.1*.
3. To advance to the next digit, press the **Kg/Lb** key twice quickly. The digit you changed will move left and the right most digit will again be *0*. Again, hold the **Kg/Lb** key until the right most digit is equal to the next digit in the numbers you want.
4. Continue as in Step 3 until you are displaying the value you want, then press the **TARE** key.
5. You can now accurately weigh the patient.
6. To cancel the tare weight, press and hold the **TARE** key until *TARE* disappears from the display and the display returns back to *0.0*. The tare weight is also cancelled when the scale is turned off.

4.0 Scale Configuration

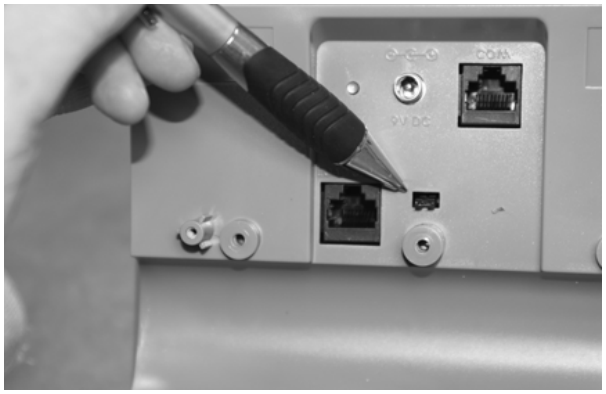
Options and parameter setup are done through the scale configuration section and is used for setting values and various parameters and options that are essential for the functioning of the system. Entry into this mode is possible only when the scale is turned off.

4.1 Enabling Configuration or Calibration Modes

Before the scale will enter either the Configuration or Calibration mode, the configuration enable jumper must be removed.

Access to that jumper is gained by removing the back cover of the indicator. Remove the four back cover retaining screws as shown on the left side of Figure 4-1. With the cover removed, the jumper can be seen sticking through the hole in the rear housing (shown in Figure 4-1 - right side). Remove that jumper to gain access to the configuration and calibration modes.

Remove retaining screws x 4 (only 2 shown)



Remove jumper to gain access to configuration and calibration modes

Figure 4-1. Gain Access to the Configuration/Calibration Enable Jumper on the Back of the Indicator

After configuration or calibration is done, the jumper must be replaced for normal scale operation.

Note ***A display of Con En indicates that the jumper is not in place. Put jumper on both pins to return the scale to normal weigh mode.***

4.2 Configuration Mode

To get into the configuration mode, turn the scale off and remove the configuration jumper as shown in Figure 4-1. Turn the scale on. While *Start* is displayed, press and hold the **Kg-Lb** key until *IDENT* appears on the display.

To change from one parameter to the next, press the **REWEIGH** key once.

To change the value of the parameter, use the **Kg-Lb** key.

From the *SAVE* phase: to save the configuration data, press the **REWEIGH** key. *DONE* appears for one or two seconds followed by *Start* and the display enter into weighing mode and is ready to start the weighing process. To exit with saving changes, press the **Lb/Kg** key.

Various parameters can be set up while in programming mode.

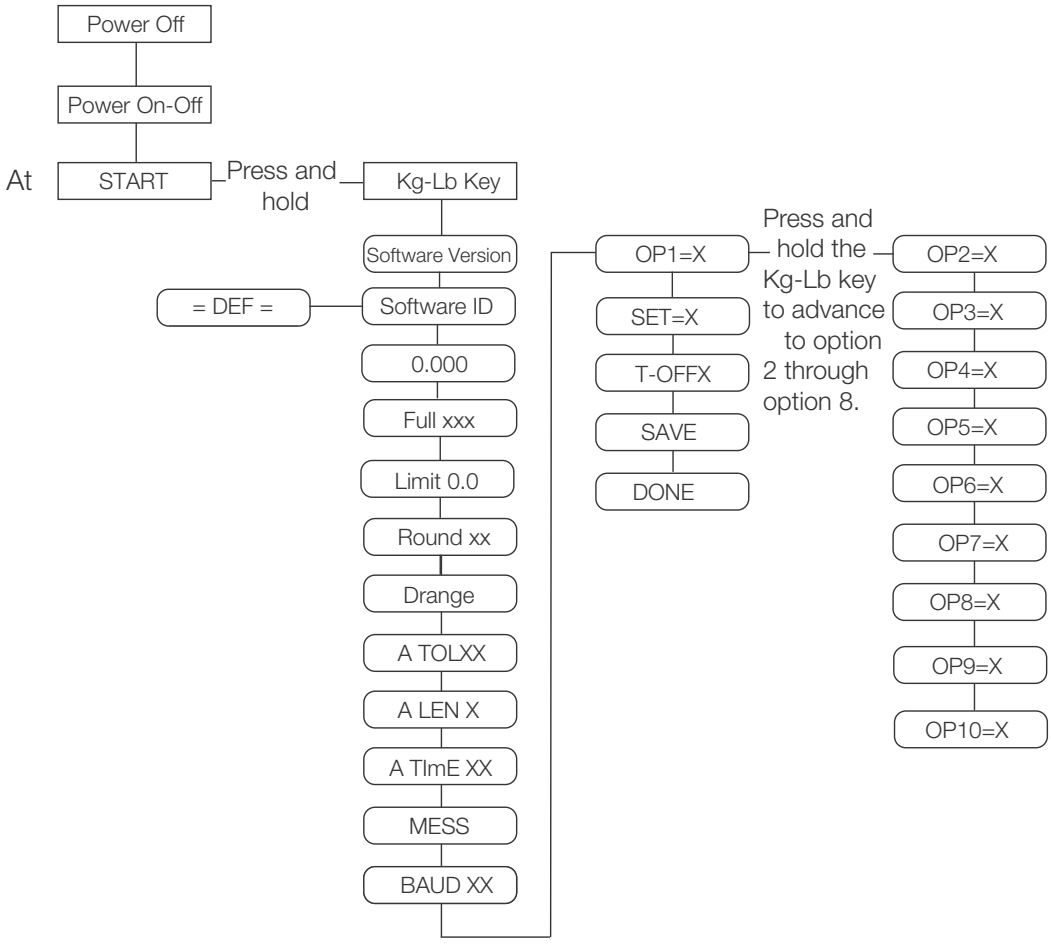


Figure 4-2. Programming Mode Menu Structure

4.3 Numeric Data Entry

Use the **Kg-Lb** key to change the numeric data entry while setting up the various configuration parameters and while in calibration mode.

Use the following steps:

1. Press and hold the **Kg-Lb** key, the rightmost digit on the display will begin to increment.
2. Release the **Kg-Lb** key to stop the increments.
3. A double click on the **Kg-Lb** key will cause the right hand digit to move one place to the left.
4. Repeat steps 1-3 until the desired number is reached.

The following table lists the various display messages and sequence when setting up the scale.

Note <-> means that you can toggle between two values.

Step	Function	Display	Available Parameters
1	*With the scale turned off, remove the confiiguration jumper as shown in Figure 4-1.		Allows the scale to enter into either configuration or calibration mode.
2	Enters into programming mode *With the scale turned off, simultaneously press the **On-Off/Zero** and **Kg-Lb** key.	StArt	Scale automatically advances to Step 3.
3	Indentifies the software ID	IdEnt<->**11007**	Press the **REWEIGH** key to advance to the next step.
4	Identifies software version	Id<->11387	Press the **REWEIGH** key to advance to the next step.
5	Allows selection of decimal point setting	dOt<->000.0 Default = **0.0**	To change the position of the decimal point, press the **Kg-Lb** key to toggle through the various options. To advance to the next step, press the **REWEIGH** key.
6	This indicates the maximum allowed weight. Any weight above this value will cause *StOP* to appear on the display while in the weighing mode.	FULL<->XX.XXX Default= **600 Lb** **Note** ***This value is dependent on the model you have. Refer to the serial number label on your scale and set appropriately.***	Use the numeric data entry (See “Numeric Data Entry” on page 12.) to change the value. To advance to the next step, press the **REWEIGH** key.
7	This limit defines the start of the weighing threshold to compensate for a key press during the Tare function.	Limit<->0.0	Use the numeric data entry (See “Numeric Data Entry” on page 12.) to see the optimum weight value of 5 lbs. To advance to the next step, press the **REWEIGH** key.
8	Display divisions	rOUnd<->XXXX Default = **0.2 Lb**	To change the display divisions, press the **Kg-Lb** key to toggle through the various options. 0.2, 0.5, 1.0, 2.0, 5.0, 10.0, 20.0. To advance to the next step, press the **REWEIGH** key.
9	Double ranges limit	drAnGe <-> **0**	This parameter is preset from the factory. To advance to the next step, press the **REWEIGH** key.
10	Weight algorithm initial tolerance	A tOL <-> **10**	This parameter is preset from the factory. To advance to the next step, press the **REWEIGH** key.
11	Weight algorithm initial exponent	A LEn <-> **8**	This parameter is preset from the factory. To advance to the next step, press the **REWEIGH** key.
12	Weight algorithm maximal exponent	A t INE <-> **10**	This parameter is preset from the factory. To advance to the next step, press the **REWEIGH** key.

Table 4-1. Configuration Mode Menu

Step	Function	Display	Available Parameters
13	Message style on weight algorithm	MESS <-> **WEIGH**	This displays the message that will show on the indicator display. To change the message, press the **Kg-Lb** key. WEIGH, LIVE, - - - - - - To advance to the next step, press the **REWEIGH** key.
14	This allows for setting the baud rate of the RS-232 connection	BAUd <-> Default - **9600**	To change the baud rate, use the numeric data entry (See "Numeric Data Entry" on page 12.) To advance to the next step, press the **REWEIGH** key.
15	**Optional features** Option 1 allows the selection of unit of measure (UOM) in calibration and programming.	OP1 = **1**	Hold the **Kg-Lb** key for browsing through the options. Double click on the **Kg-Lb** key to change the options value or to advance to the next step, press the **REWEIGH** key. OP1 = Unit of measure (UOM) in calibration and programming. 0=Kg **1=Lb**
	Option 2 allows the scale to work only in Kg.	OP2 = **0**	Hold the **Kg-Lb** key for browsing through the options. Double click on the **Kg-Lb** key to change the options value or to advance to the next step, press the **REWEIGH** key. **0=Disable** 1= Enable This option works only if Option 3 is disabled
	Option 3 allows the scale to work only in Lb.	OP3 = **0**	Hold the **Kg-Lb** key for browsing through the options. Double click on the **Kg-Lb** key to change the options value or to advance to the next step, press the **REWEIGH** key. **0=Disable** 1=Enable
	Option 4, the scale must be stable to show a Kg or Lb weight reading. You can enable or disable this.	OP4 = **0**	Hold the **Kg-Lb** key for browsing through the options. Double click on the **Kg-Lb** key to change the options value or to advance to the next step, press the **REWEIGH** key. **0=Disable** 1=Enable Note ***Won't show lb or kg until the scale is at a standstill.***
	Option 5 allows for live or dynamic weighing	OP5 = **0**	Hold the **Kg-Lb** key for browsing through the options. Double click on the **Kg-Lb** key to change the options value or to advance to the next step, press the **REWEIGH** key. **0=Disable** 1=Enable

Table 4-1. Configuration Mode Menu

Step	Function	Display	Available Parameters
	Option 6 allows you to either enable or disable the hold function on the scale	OP6 = **1**	Hold the **Kg-Lb** key for browsing through the options. Double click on the **Kg-Lb** key to change the options value or to advance to the next step, press the **REWEIGH** key. 0=Disable **1=Enable**
	Option 7 allows you to either enable or disable the baby scale function.	OP7=**0**	Hold the **Kg-Lb** key for browsing through the options. Double click on the **Kg-Lb** key to change the options value or to advance to the next step, press the **REWEIGH** key. **0=Disable** 1=Enable **Note** ***Leave set to 0***
	Option 8 allows you to choose between 9 volts and 6 volts	OP8 = **1**	Hold the **Kg-Lb** key for browsing through the options. Double click on the **Kg-Lb** key to change the options value or to advance to the next step, press the **REWEIGH** key. 0=9 volts **1=6 volts** **Note** ***Leave set to 1***
	Option 9 allows you to select the communications protocol.	OP9 = **1**	Hold the **Kg-Lb** key for browsing through the options. Double click on the **Kg-Lb** key to change the options value or to advance to the next step, press the **REWEIGH** key. 0= escape **1= standard protocol**
	Option 10 allows you to enable the user menu.	OP10 = **1**	Hold the **Kg-Lb** key for browsing through the options. Double click on the **Kg-Lb** key to change the options value or to advance to the next step, press the **REWEIGH** key. 0= enable **1= disable**
16	Set Option defaults	Set < - > **1**	To change, press the **Kg-Lb** key. 0 - default Options = (OPx) **1 = US default** (US defaults are OP1-1, OP2-0, OP3-0, OP4-0, OP5-0, OP6-1, OP-7-0, OP8-1, OP9-1, OP10-1). 2 = European 1 default 3 = European 2 default 9 = Used if OP1 through OP10 have been changed to something other than the factory default settings. **Note** ***Always set to 1 or 9 for US indicators. To advance to the next step, press the*** **REWEIGH** ***key.***

Table 4-1. Configuration Mode Menu

Step	Function	Display	Available Parameters
17	Determines the automatic shut off time when the scale is not in use. Options are between one and 20 minutes. This is used when the unit is battery operated.	t-OFF <-> **5**	Press and hold the **Kg-Lb** key to scroll through the furthest right hand digit on the display (0-9). If you want a value from 10 to 19, with the display sitting at 1, double press the **Kg-Lb** key and 10 appears. Press and hold the **Kg-Lb** key to begin scrolling 10-19. If you want a value of 20, with the display sitting at 2, double press the **Kg-Lb** key and 20 will appear. To advance to the next step, press the **REWEIGH** key.
18		StArt or SAvE	If no changes were made in the parameters the display will automatically show *StArt* and then returns to normal weighing mode. If a parameter was changed, the display will show *SAvE.* To save changes made, press the **REWEIGH** key. To return to weigh mode without saving changes, press the **Kg-Lb** key.
19		Con En	Replace the configuration jumper.
* Indicates procedure to perform.			

Table 4-1. Configuration Mode Menu

4.4 Reset To Factory Defaults

The configuration parameters may be reset to factory defaults while in the configuration mode. To do so, enter the configuration mode. Press the **REWEIGH** key once to advance to displaying the software version (ID <-> 11305). Press and hold the **BMI** key until *=DEF=* is displayed. At this point, if you wish to perform the default function, press the **REWEIGH** key and the scale will show *DONE*, then it will restart. If you do not want to perform the default function, press the **ON/OFF** key.

After performing the default function, the scale will require re-calibration. In addition, the scale will be set up to a capacity of 600 lbs. The capacity varies by model - refer to the serial label on your scale and reconfigure the capacity (FULL) and display divisions (rOUnd) as necessary in the configuration menu.

5.0 Scale Calibration

Before you can calibrate the scale, verify and set all scale parameters which are noted in "Scale Configuration" on page 11.

Remove the configuration/calibration jumper (see page 11). Turn the scale on. While *StArt* is displayed, press and hold both the **Kg-Lb** key and the **REWEIGH** keys until *CAL* is displayed.

To do a calibration on the scale, the scale must be turned off.

Note ***The calibration weight must be no less than 60 lb (28 kg) and no more than 300 lb (135 kg).***

The following chart illustrates the calibration procedure.

Step		Function	Display	Available Parameters
1	Turn the scale on. While *START* is displayed, press and hold the **Kg-Lb** and **REWEIGH** keys until *CAL* is displayed.	Enters into calibration mode	StArt	The scale automatically advances to Step 2.
2		Cal mode entered	CAL	To advance to the next step, press the **REWEIGH** key.
3		Sets the value of the calibration weight you are going to use for calibrating the span value of the scale.	LOAd <-> XXX.X	Use the numeric data entry (explained in "Numeric Data Entry" on page 12) to set a calibration weight. To advance to the next step, press the **REWEIGH** key.
4			CLEAr	Clear the platform and be sure of the scale's stability. To advance to the next step, press the **REWEIGH** key.
5	Calibrate Zero		- - - - - PUT<->XXXX	Place the requested weight on the scale. This will display for a few seconds. To advance to the next step, press the **REWEIGH** key.
6	Calibrate Span		CAL FAC tOr <-> X.XXX	This will be displayed for a few seconds and shows the current calibration factor. To advance to the next step, press the **REWEIGH** key.
7			SAvE	To save the new calibration, press the **REWEIGH** key. To exit without saving the calibration press the **ZERO** key.
8			dONE	The scale displays that it has saved that calibration value and automatically advances to the last step.
9			StArt	The scale reboots.
10			Con En	Replace the configuration jumper.

Table 5-1. Calibration Menu

6.0 RS-232 Communication

The scale comes with an RS-232 port which enables weight data to be transmitted to other equipment, such as a computer or printer. The RS-232 cable with DB-9 connector (PN 100719) is available from Rice Lake Weighing System. Figure 2-8 on page 6 shows where the RS-232 connection is.

The RS-232 parameters are 9600 baud (selectable in the programming mode), 8 data bits, 1 stop bit, no parity and no handshaking.

There are three methods of communication:

- Pushbutton keypad print
- Standard remote protocol
- Escape protocol

6.1 Pushbutton Keypad Print

With a stable, in-range weight, press and hold the **Kg-Lb/Print** key for at least three seconds, or until the scale emits two quick beeps. Note that if the scale does not beep after five seconds, then release the button as the weight was either in motion, or out of range.

- If displaying weight and not BMI, the scale will send out the following 21 character string:

xxxxxxxxx<SP>uu<SP>mmmmm<SP><CR><LF>

Where:

xxxxxxxxx is the weight with decimal point and " - " sign, if negative uu is the unit (lb or kg).

mmmmm is the mode (gross or net)

Examples:

-10 Lb net = <SP><SP><SP><SP>-10.0<SP>lb<SP><SP>Net<SP><SP><SP><CR><LF>
10 Lb gross = <SP><SP><SP><SP><SP>-10.0<SP>lb<SP>Gross<SP><CR><LF>

- In BMI mode (displaying the BMI value), the scale will send out the following data:

GROSS WEIGHT	215.0 LB
TARE WEIGHT	0.0 LB
NET WEIGHT	215.0 LB
PATIENT HEIGHT	6-01.0 FT
PATIENT BMI	28.4

6.2 Standard Remote Protocol (configuration option #9 set to 1)

When connected to a computer, there are five commands that can be used in the standard remote protocol to communicate with the scale. They are:

- t - tare the scale. If in gross mode, will tare and go to net mode. If in net mode, will remove tare and return to gross mode.
- w - the scale sends the actual weight to the computer.
- i - the scale sends the software ID of the scale.
- z - the scale will be set to zero (0.0) if possible.
- p - the scale sends the same data as a pushbutton keypad print.

The format of the returned data will be the same as noted under the pushbutton keypad print. Note that the w and p commands will not return a value if the scale is in motion, or displaying an invalid weight.

6.3 ESC Protocol (configuration option #9 set to 0)

The ESC Protocol differs from the standard protocol and enables weight and unit of measure data to be transmitted for full integration into electronic medical records or for diagnostic testing of the battery life, load cells, etc. The scale will only transmit data upon receiving the proper command set.

You can test the command set and review the scales' response using either PROCOMM Plus or the Dietary/ Fitness files found on our web site, **www.ricelake.com/health**. If using PROCOMM Plus, we recommend you set up "hot" keys for the commands. Refer to Table 6-1 for a listing of those commands.

An Escape Protocol is where the escape <ESC> is used to indicate that there is a command following and not just data.

Table 6-1 lists a complete list of ESC commands that are used with the scale.

Command/ Response	ESC Character	ESC value with Parameters	Description
Reading	R	R	This value tells the PC that the scale is sending a reading. Immediately following this will be the value that is sent Example: <ESC>R<ESC>E <ESC>R<ESC>W0200.5<ESC>Nm<ESC>E
Weight	W	Wnnn.n	This is the patient's weight (ie: W0200.5 means 200.5 lb). If the scale is overloaded, the scale will return the value of 999.9.
Units	N	Nc	This indicates in which unit the values have been taken (m=metric, c=constitutional
End of Packet (EOP)	E	E	This indicates that the end of the command/data packet has been reached
Diagnostics (request)	A	Accc	This is the request for a diagnostic test on certain parts of the scale such as the battery life, loadcells, etc. • AD value (ADC) = E06=AD is too high, E07=AD is too low • Overload (OVL) = E10 • Battery (BAT) = E4U= (Bat ok) or E4L (Bat Low, but still usable - 1 bar left on the indicator • Calibration information OK (CAL) = E11=Calibration was not okay and the user needs to recalibrate.
Diagnostics (response)	Z	Zccc	This will be the response to the diagnostics done on the scale. Values will include any error codes to indicate what is wrong with the scale, or all zeros (Z000) to indicate that all is well.
Control (set a value)	C	Cccc=c	This is to set the value of the scale's global settings <ESC>CUOM=m<ESC>E will set the unit of measurment to KG • Unit of measurement (metric or constitutional) (UOM) = c (m or c)

Table 6-1. RS-232 Communication Parameters

If you're using the Rice Lake files, please follow the instructions below.

1. Go to www.ricelake.com/health and download the Rswin.exe and Inbar.ini files located in the downloads section of the web site and download them to your computer.
2. Ensure that the scale is connected to the computer via RS-232 cable.

3. Double click on the Rswin.exe file and the following screen appears.

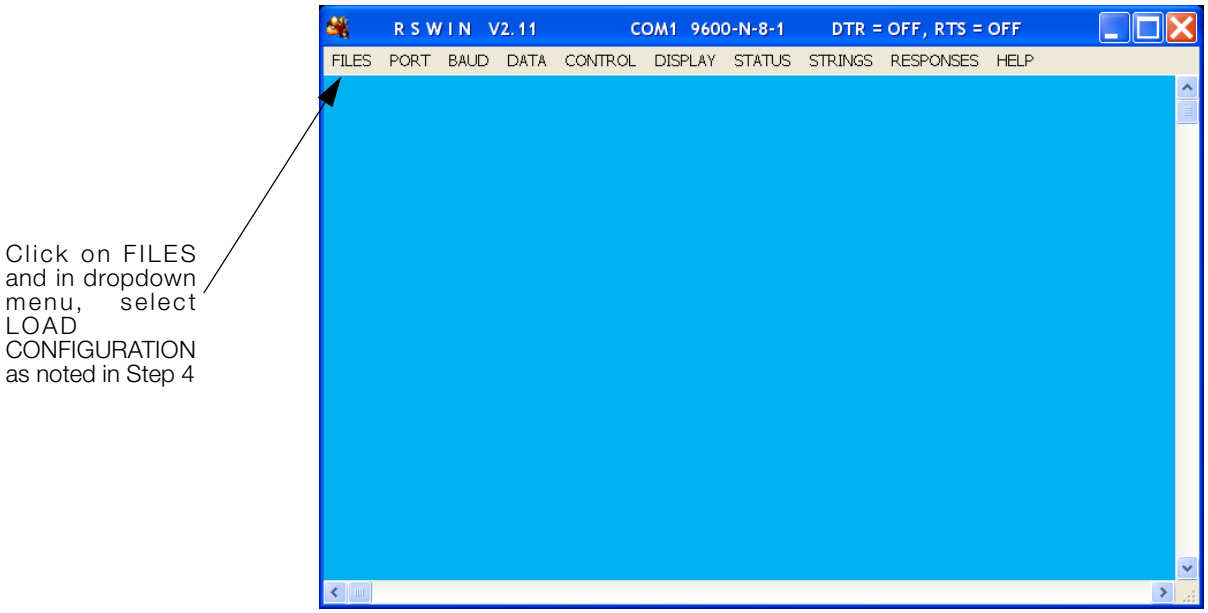

Click on FILES and in dropdown menu, select LOAD CONFIGURATION as noted in Step 4
RSWIN V2.11 COM1 9600-N-8-1 DTR = OFF, RTS = OFF
FILES PORT BAUD DATA CONTROL DISPLAY STATUS STRINGS RESPONSES HELP

Figure 6-1. Rswin Screen

4. Click on *FILES* and in the dropdown menu, select *LOAD CONFIGURATION*. At this time double click on the file, Inbar.ini.
5. Click on *STRINGS* and the following screen appears.

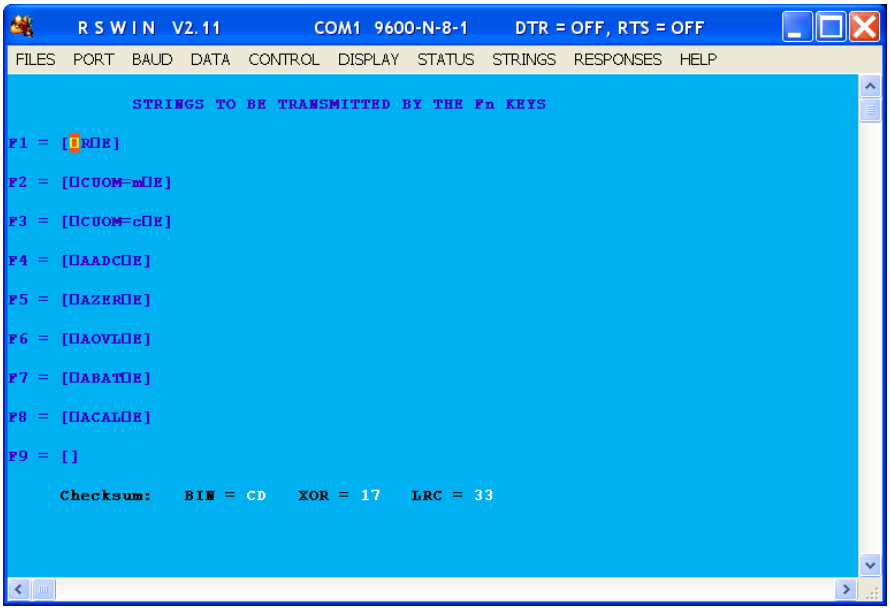

RSWIN V2.11 COM1 9600-N-8-1 DTR = OFF, RTS = OFF
FILES PORT BAUD DATA CONTROL DISPLAY STATUS STRINGS RESPONSES HELP
STRINGS TO BE TRANSMITTED BY THE Fn KEYS
F1 = [□R□E]
F2 = [□CUOM=m□E]
F3 = [□CUOM=c□E]
F4 = [□AADC□E]
F5 = [□AZER□E]
F6 = [□AOVL□E]
F7 = [□ABAT□E]
F8 = [□ACAL□E]
F9 = []
Checksum: BIN = CD XOR = 17 LRC = 33

Figure 6-2. Strings to be Used in the RS-232 Transmission

This screen is showing that the function keys are already pre-programmed with command sets. For example, pressing the **F1** key is the same as sending <ESC>R<ESC>E.

6. Click on *DISPLAY* and in the drop down menu, select either *HEX* or *ASCII*.

Examples of what you would see in the HEX screen are shown in Figure 6-3.

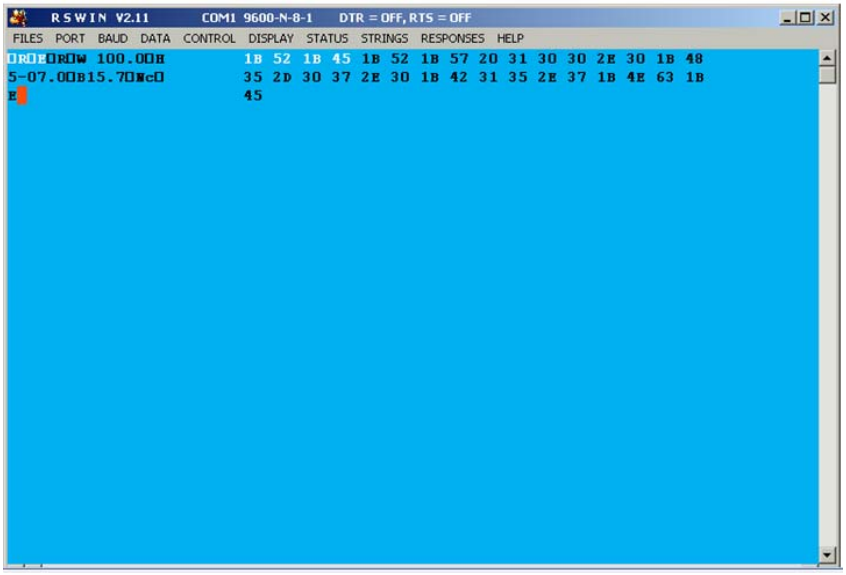

RSWIN V2.11 COM1 9600-N-8-1 DTR = OFF, RTS = OFF
FILES PORT BAUD DATA CONTROL DISPLAY STATUS STRINGS RESPONSES HELP
1B 52 1B 45 1B 52 1B 57 20 31 30 30 2E 30 1B 48
35 2D 30 37 2E 30 1B 42 31 35 2E 37 1B 4E 63 1B
45

Figure 6-3. HEX Screen Example

Examples of what you would see in the ASCII screen are shown in Figure 6-4.

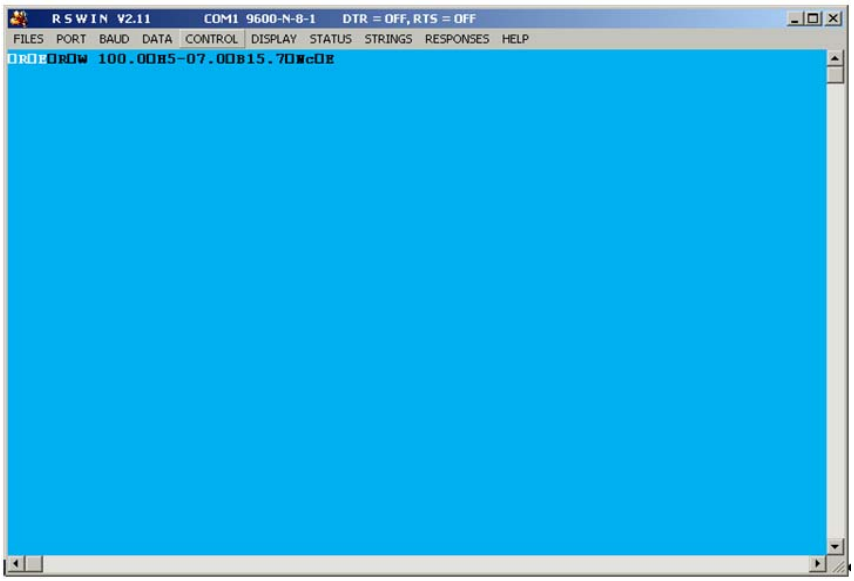
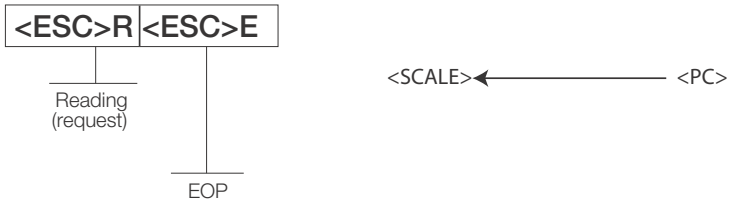


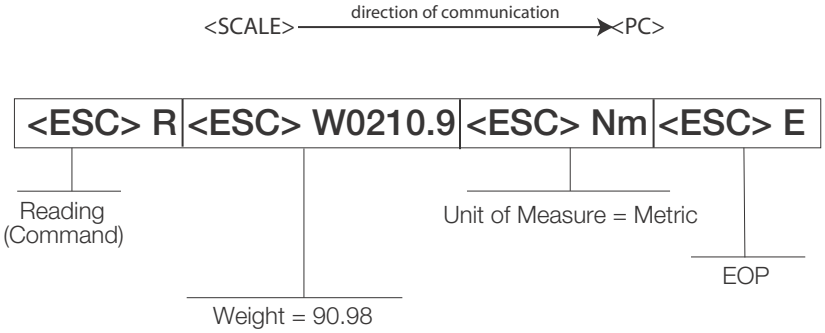
Figure 6-4. ASCII Screen Example

6.4 Sample and Explanation of ESC Protocol

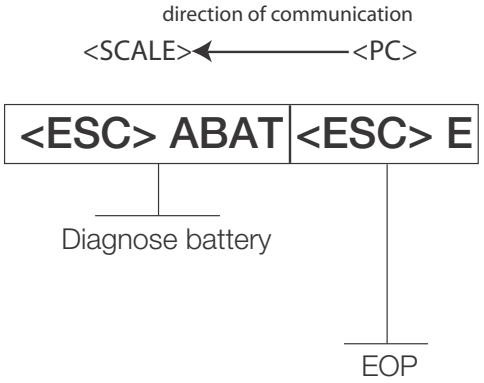
When the scale measures weight and sends this over the communications line to the PC, the string will look like this.

<SCALE> --------<PC>

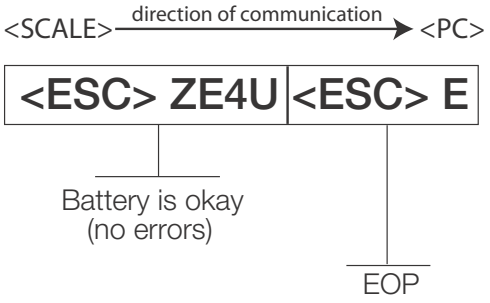




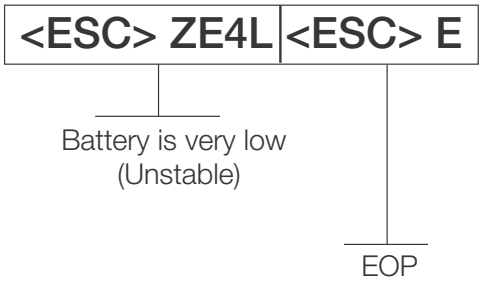
When the user wants to diagnose any problems with the scale, the operator will have to ask the scale to send the error data (if any exists). This is done with the Diagnostics (request) command and will look like this:



If the battery is okay, the scale will reply with the following value:



If the battery is critically low, it will reply with:



7.0 Troubleshooting and Testing

Refer to the following instructions to check and correct any failure before contacting service personnel.

Symptom	Possible Cause	Corrective Action
Scale does not turn on	Dead battery	Connect the scale to a power source.
	Faulty electrical outlet	Use a different electrical outlet.
	Bad power supply	Replace adaptor.
Questionable weight or the scale does not zero	External object is interfering with the scale	Remove the interfering object from the scale.
	Display did not show 0.0 before weighing	Help the patient off the scale, zero the scale and begin the weighing process again.
	Scale is not placed on a level floor	Ensure the scale is level using the spirit level on the platform and begin the weighing process again.
	Scale is out of calibration	Check the weight with a known weight value.
	Improper tare	Place the patient on the scale. Press **REWEIGH**. Once the weight of the item is displayed, press **TARE**. Place the patient back on the scale. Press the **REWEIGH** button again.
Weighing is performed but the display shows *WEIGH* and *REWEIGH* every few seconds; the weighing process takes too long and no weight is displayed	The patient is not sitting still	Ask the patient to be still.
The display shows a *STOP* message	The load on the scale exceeds the capacity of the scale (220 kg)	Remove the excess weight and use the scale according to manufacture's specs.
The display shows *LO Bat* message	The battery is low	Recharge the battery.
The display shows Err message as detailed in the table below		
Err 2	Low saturation state (low A/D)	The load cell is not connected properly. Check the cables and mechanical connections. If the problem persists, replace the set of load cells.
Err 3	High saturation state (high A/D)	See Err 2
Err 6	Unstable weight. Cannot calibrate	Check the load cells' mechanical surroundings and see that nothing touches them and that the cables are properly welded.
Err 7	Mathematical error; division by zero. Cannot calculate calibration factor.	This error will show when trying to calibrate the unit with no calibration weight on the unit.
Calibration or configuration settings are messed up	Pushed the wrong keys	Reset to factory defaults. See page 16 for instructions.

Table 7-1. Troubleshooting Table for the Rice Lake Scale Line

7.1 Test Mode

The test mode menu is a special mode used for checking four very important parameters which are useful in knowing the system's state and for troubleshooting. Entry into this mode is possible only when the scale is turned off. Turn the scale on. While *Start* is displayed, press and hold the **REWEIGH** key until both the middle arrows appear on the display.

The test mode has four parameters. They are:

- Weighing
- Internal count
- Battery indication
- Calibration factor

Alternating between the parameters is performed by pressing the **REWEIGH** key.

Press the **Kg-Lb** key to zero the scale in test mode.

Press the **Kg-Lb** + **REWEIGH** to exit weighing mode.

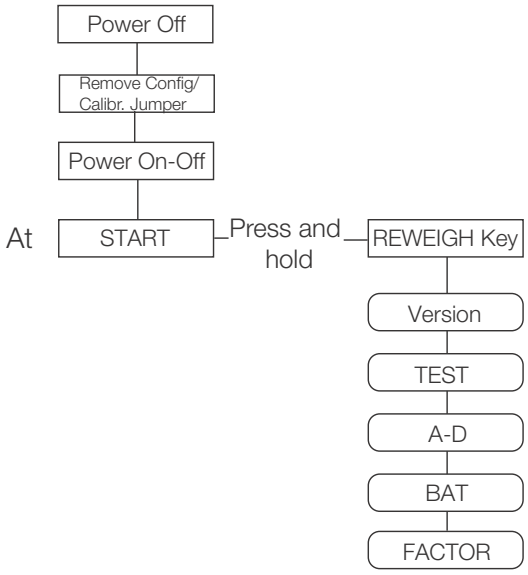


Figure 7-1. Test Mode Menu Structure

Table 7-2 lists the various display messages when testing the scale.

Note <-> means that you can toggle between the two values.

Step		Function	Display	Available Parameters
1	With the scale turned off, simultaneously press the **REWEIGH** and **On-Off/Zero** keys.	This enters into the test mode of the scale.	StArt	The scale automatically advances to Step 2.
2		Identifies the software ID	IdEnt <-> **11007**	Press the **REWEIGH** key to advance to the next step.
3		Shows the current weight value	tESt <-> 0.0	To advance to the next step, press the **REWEIGH** key.
4		Shows the current A/D count	A-d <-> XXXX	To advance to the next step, press the **REWEIGH** key.

Table 7-2. Test Mode Menu

Step		Function	Display	Available Parameters
5		Checks for current battery level	bAt <-> XXX or nO bAt	If the *nO bAt* is displayed, there are not batteries in the unit or the unit is operating on its external AC adaptor. To advance to the next step, press the **REWEIGH** key.
6		This shows the calibration factor	FACtOr <-> XXXXX	Press the **REWEIGH** key to return to the top of the test menu. To exit test mode, press the **REWEIGH** and **Kg-Lb** key simultaneously, or turn off the indicator.

Table 7-2. Test Mode Menu

8.0 Maintenance

The following section provides instructions for maintaining and cleaning the Rice Lake line of scales. Maintenance operations other than those described in this section should be performed by qualified service personnel.

8.1 Basic Maintenance

Before the first use of the scale and after periods of non-use, check the scale for proper operation and function. If the scale does not operate correctly, contact qualified service personnel.

Go through the following steps for basic maintenance.

1. Check the overall appearance of the entire scale for any obvious signs of damage, abuse, etc.
2. Inspect the condition of the AC adaptor for cord cracking or fraying or for broken or bent prongs.

8.2 Cleaning

Proper care and cleaning is essential to ensure a long life of accurate and effective operation. Before beginning the cleaning process, disconnect the scale from the AC power source.

1. Clean all external surfaces with a clean, damp cloth or tissue. Mild soap and water solution may be used. Dry with a clean soft cloth.
2. Do not immerse the scale into cleaning or other liquid solutions.
3. Do not use Isopropyl alcohol or other solutions to clean the display surface.

8.3 Trimming Procedure

Trimming is the process of equalizing the output from multiple individual load cells. If needed, load cells can be individually trimmed with potentiometers.

Whenever a substantial amount of trim (more than 5% of normal output) seems necessary to equalize output, check for other possible problems. The best trim is always the least amount of trim. When all errors except load cell mismatch and cable extensions or reductions have been corrected, continue with the trimming.

Use the following steps to properly trim the scale.

1. Zero the indicator and place a calibrated 70 kg test weight over each load cell in turn as shown below in Figure 8-1 starting in the following sequence.
   - Start with the furthest left hand corner (1)
   - Nearest lefthand corner (2)
   - Furthest righthand corner (3)
   - Nearest righthand corner (4)

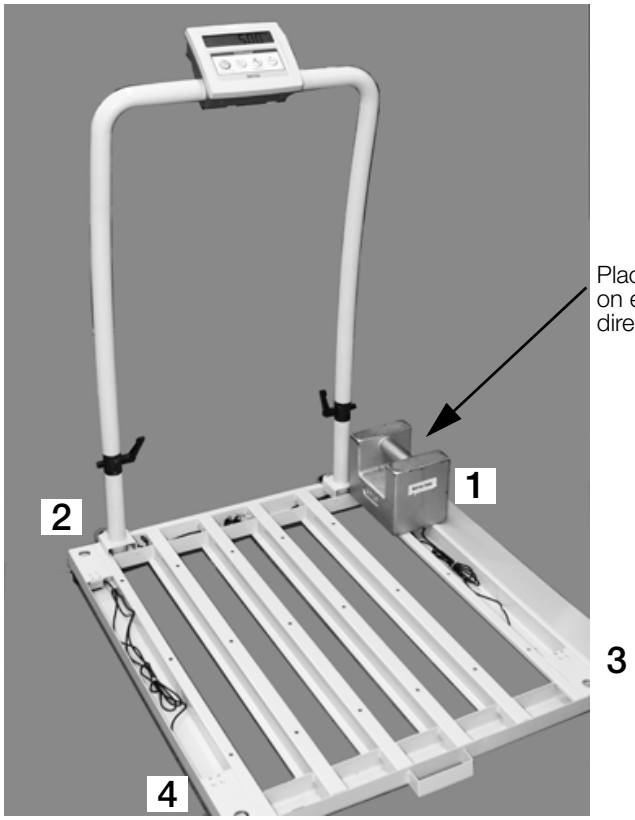

Place a known test weight on each corner of the scale directly over the load cell.
Place test weight in the following numbered sequence.
1
2
3
4

Figure 8-1. Wheelchair Trimming Corners Sequence

2. Record the value displayed on the indicator after the test weight is placed in turn on each corner (directly over the load cell), without allowing the weight to overhang the sides of the scale. Allow the scale to return to zero each time to check for friction or other mechanical problems. Select the load cell which has the lowest value as your reference point. This cell will not be trimmed.

3. Replace the same test load over each cell in turn measuring load cell one (1) and two (2) first and then using the corresponding potentiometer, turn each cell down to equal the referenced load cell.

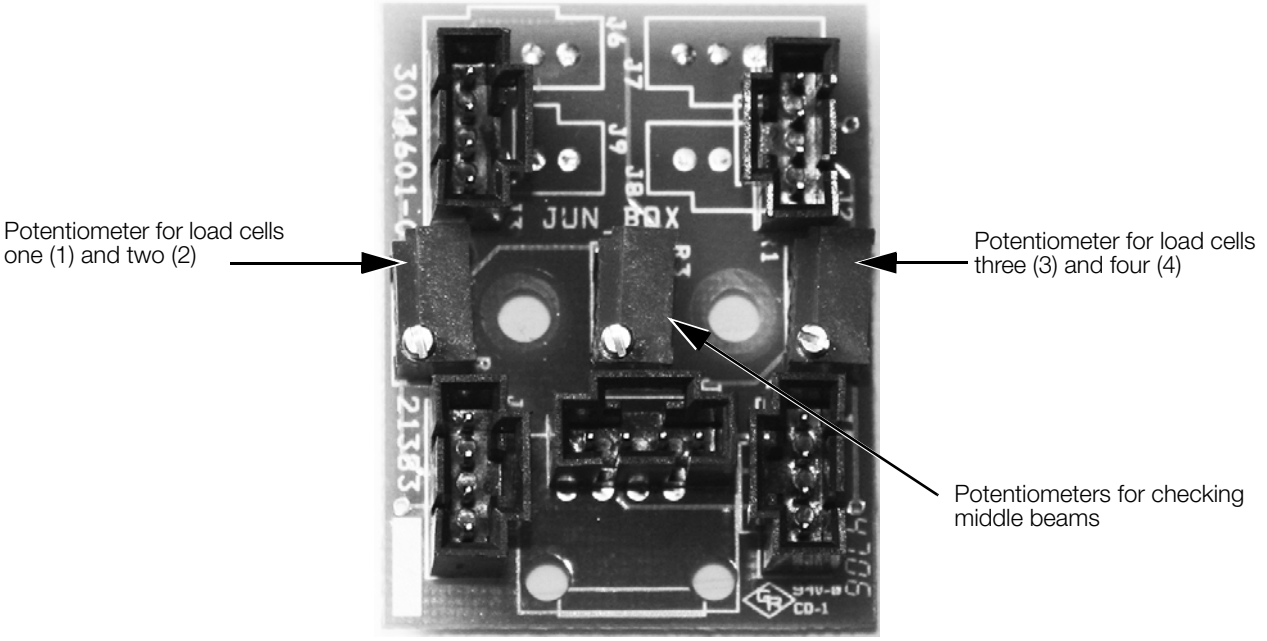

Potentiometer for load cells one (1) and two (2)
Potentiometer for load cells three (3) and four (4)
Potentiometers for checking middle beams
JUN_BOX

Figure 8-2. Load Cell Potentiometers

As the corner corrections are somewhat interactive, check all cells again for repeatability. If necessary repeat steps 1 through 3 again.

4. Now measure load cell three (3) and four (4) and use the corresponding potentiometer to turn each cell down the equal the referenced load cell.
5. Now align the two sides of the scale by:
   - Place a 70 kg weight in the center of the left hand beam and read the A/D value.
   - Place a 70 kg weight in the center of the right hand beam and read the A/D value.
   - Turn the corresponding potentiometer until an equal value is reached between the sides with a margin of 2 units of A/D.

9.0 Wheelchair Scale Specifications

Power
120 VAC-9VDC-50Hz / 230 VAC-9VDC-50Hz

Battery Type
Sealed lead acid battery

Battery Use
75 hours
Approximately 300-1200 recharge cycles available depending on battery discharge activity
Automatic power-off can be configured from 0 - 20 minutes

Data Communications
RS-232 with RJ-45 jack
Selectable baud rate, default - 9600
8 bits
No parity
1 stop bit
No handshaking

Environmental
Operating Temperature
50 to +104°F (14 to 40°C)
Storage Temperature
32 to 158°F (0 to 70°C)
Humidity
85% relative humidity

Capacity and Graduation
1000lb (453kg) 0.2lb (0.1kg)

Certifications and Approvals
RoHS Compliant

Dimensions
Platform Dimensions
29.5 in W x 32 in L x 3 in H

For More Information

System Manuals

- *Digital Wheelchair Scale Operation Instructions*, PN 113804

Literature

- *Medical Scales, Wheelchair Scales, 4 Color*, PN 115157

Web Site

- http://www.ricelake.com/health

Contact Information

Hours of Operation

Knowledgeable customer service representatives are available 6:30 a.m. - 6:30 p.m. Monday through Friday and 8 a.m. to 12 noon on Saturday. (CST)

Telephone

- Sales/Technical Support 800-472-6703
- Canadian and Mexican Customers 800-321-6703
- International 715-234-9171

Immediate/Emergency Service

For immediate assistance call toll-free 1-800-472-6703 (Canadian and Mexican customers please call 1-800-321-6703). If you are calling after standard business hours and have an urgent scale outage or emergency, press 1 to reach on-call personnel.

Fax

Fax Number 715-234-6967

Email

- US sales and product information at prodinfo@ricelake.com
- International (non-US) sales and product information at intlsales@ricelake.com

Mailing Address

Rice Lake Weighing Systems

230 West Coleman Street

Rice Lake, WI 54868 USA

Digital Wheelchair Scale Limited Warranty

Rice Lake Weighing Systems (RLWS) warrants that all RLWS equipment and systems properly installed by a Distributor or Original Equipment Manufacturer (OEM) will operate per written specifications as confirmed by the Distributor/OEM and accepted by RLWS. All systems and components are warranted against defects in materials and workmanship for two years.

RLWS warrants that the equipment sold hereunder will conform to the current written specifications authorized by RLWS. RLWS warrants the equipment against faulty workmanship and defective materials. If any equipment fails to conform to these warranties, RLWS will, at its option, repair or replace such goods returned within the warranty period subject to the following conditions:

- Upon discovery by Buyer of such nonconformity, RLWS will be given prompt written notice with a detailed explanation of the alleged deficiencies.
- Individual electronic components returned to RLWS for warranty purposes must be packaged to prevent electrostatic discharge (ESD) damage in shipment. Packaging requirements are listed in a publication, *Protecting Your Components From Static Damage in Shipment*, available from RLWS Equipment Return Department.
- Examination of such equipment by RLWS confirms that the nonconformity actually exists, and was not caused by accident, misuse, neglect, alteration, improper installation, improper repair or improper testing; RLWS shall be the sole judge of all alleged non-conformities.
- Such equipment has not been modified, altered, or changed by any person other than RLWS or its duly authorized repair agents.
- RLWS will have a reasonable time to repair or replace the defective equipment. Buyer is responsible for shipping charges both ways.
- In no event will RLWS be responsible for travel time or on-location repairs, including assembly or disassembly of equipment, nor will RLWS be liable for the cost of any repairs made by others.

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RICE LAKE WEIGHING SYSTEMS • 230 WEST COLEMAN STREET • RICE LAKE, WISCONSIN 54868 • USA

RICE LAKE
WEIGHING SYSTEMS

230 W. Coleman St. • Rice Lake, WI 54868 • USA
U.S. 800-472-6703 • Canada/Mexico 800-321-6703
International 715-234-9171

www.ricelake.com
mobile: m.ricelake.com

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